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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/653,157	08/31/2000	Kevin J. Torek	MI22-1376	4651

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EXAMINER
DEO, DUY VU

ART UNIT	PAPER NUMBER
1765	7

DATE MAILED: 01/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/653,157	TOREK ET AL.	
	Examiner	Art Unit	
	DuyVu n Deo	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 January 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1 and 7 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation "feeding a single gas through an ozone generator to generate ozone from the feed gas" is not described in pages 4, 5, and 10 of the specification. In contrast, these pages describe at least 2 feeding gases oxygen and nitrogen. Further more, how can be a single feeding gas when the feeding gas comprises 99.999% oxygen? There must be another 0.001% of other gases including nitrogen as describes in pages 4, 5, and 10. At this time, the feeding gas will be treated as described in the specification where there are oxygen and other gas including nitrogen.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1 and 7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation "feeding a single feed gas...the feed gas comprising at least 99.999% O2 (by volume)" is vague and indefinite because how could there is a single feed gas when there are 0.001% V of other gases other than O2 in the mixture.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 4, 7, 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Harada et al. (US 5,631,868).

Harada describes a method for removing an organic compound such as photoresist from a semiconductor substrate comprising: feeding an oxygen gas having a purity of at least 99.999% (this feed gas or oxygen would comprise less than or equal to 0.001% of N2) through an ozone generator to generate ozone; and contacting the ozone with the resist on the substrate to remove the resist (col. 2, line 56-60; col. 7, line 5, line 38-40; col. 9, line 26-30).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 2, 3, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada as applied to claims 1 and 7 above, and further in view of Ury et al. (US 4,885,047).

Unlike claimed invention, Harada doesn't describe irradiating at least some of the ozone with UV prior to the contacting. Ury describes a same method of removing resist wherein he teaches of using ozone and irradiating the resist with during the process. Some of the ozone would have to be irradiated with UV to create ozone fragments prior to the contacting and proximate the resist during the process. (col. 4, line 19-39). It would have been obvious for one skill in the art to modify Harada in light of Ury because Ury teaches that UV may provide an enhancement of the stripping time.

9. Claims 5, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada as applied to claims 1 and 7 above, and further in view of De et al. (JP411219926A).

Unlike claimed invention, Harada doesn't describe mixing ozone with water vapor prior to contacting. However, removing resist with ozone and water vapor has been known to one skill in the art at the time of the invention such as one taught by De (ab.). Therefore, at the time of the invention one skill in the art would find it obvious to remove resist in light of De by using ozone and water vapor, which would enhances the removal process since water would provide another source of oxidizing agent to remove the photoresist with an anticipation of an expected result.

10. Claims 6, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harada and Ury as applied to claims 1, 7 above, and further in view of Mullee (US 6,306,564).

Unlike claimed invention, above prior art doesn't describe mixing the ozone with organic solvent vapor prior to the contacting. Mullee describes a method of removing the photoresist wherein the photoresist is removed using a combination of ozone and organic solvent such as acetone, isopropanol (col. 4, line 11-30). It would have been obvious for one skill in the art to add organic solvents into the mixture because Mullee teaches that organic solvents would remove organic contaminants from the wafer surface (col. 4, line 22-24).

Even though Mullee doesn't describe using the organic solvents as vapors; however, he describes the chemicals are heated and carried by a gas into the reaction chamber so that less chemical is needed to remove the photoresist (summery; col. 2, line 56-60). It would have been obvious for one skill in the art at the time of the invention to use vapors of organic solvents because a vapor would have been easier to carry into the chamber and less amount of chemicals are used to remove photoresist.

11. Claims 12-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee (US 6,306,564).

Mullee describes a method for removing photoresist comprising forming a mixture of ozone and organic solvents including acetone, PGMEA, propylene glycol in a reaction chamber and contacting the mixture with the photoresist to remove at least some of the photoresist from the substrate (col. 4, line 11-36). Unlike claimed invention, Mullee doesn't describe the organic solvents as vapors. However, he describes the chemicals are heated and carried by a gas into the reaction chamber so that less chemical is needed to remove the photoresist (summery; col. 2, line 56-60). It would have been obvious for one skill in the art at the time of the invention to use

vapors of organic solvents because a vapor would have been easier to carry into the chamber and less amount of chemicals are used to remove photoresist.

Referring to claims 14-15, even though Mullee describes doesn't describe the metal layers exposing to chemicals (i.e. ozone) are Al2O3 or platinum; however, using the photoresist to etch a substrate that includes aluminum oxide or platinum are known to one skill in the art and would depending on the type of device being processed (please see below cited art). Removing the resist would also expose the aluminum oxide or Pt to the ozone.

Referring to claim 17, it would be obvious that the solvents' reservoirs can be anywhere within or outside the chamber as long it could provide organic vapor for the resist removal.

Referring to claims 20, 21, it would have been obvious for one skill in the art to use other organic solvent such as cyclohexanone to remove photoresist with an anticipation of an expected result.

12. Claims 25-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mullee and further in view of Ury et al. (US 4,885,047).

Unlike claimed invention, Mullee doesn't describe irradiating at least some of the ozone with UV prior to the contacting. Ury describes a same method of removing resist wherein he teaches of using ozone and irradiating the resist with during the process. Some of the ozone would have to be irradiated with UV to create ozone fragments prior to the contacting and proximate the resist during the process. (col. 4, line 19-39). It would have been obvious for one skill in the art to modify Mullee in light of Ury because Ury teaches that UV may provide an enhancement of the stripping time.

13. Nomoto (US 6,133,603) and Dahlheim et al. (US 5,540,047) cited to show prior art.

Response to Arguments

14. Applicant's arguments with respect to claims 6, 11, 12-35 have been considered but are moot in view of the new ground(s) of rejection.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD
January 28, 2002

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